THE GLYNN COUNTY WATER RESOURCES MANAGEMENT PLAN

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Abstract. A Long Term Water Resource Management Plan was prepared for Glynn County, Georgia to both provide direction for future water supply development and to conform with State requirements for southeast Georgia counties. Water demand projections were prepared through the year 2050, based on current growth trends. Numerous water supply options were evaluated in both quantitative and qualitative terms. The most promising alternatives were recommended as either short-or long term water supply sources for Glynn County.

INTRODUCTION

Glynn County (County) historically has enjoyed abundant water and other natural resources. Located on the southeastern coast of Georgia, the area is renowned for its scenic marshes and the tourist attractions of the "Golden Isles" - Jekyll, Saint Simons and Sea Islands. The County has also been attractive to industry, with abundant water supply from the Floridan aquifer, deep water port access, rail and highway transportation. Large water withdrawals from the Upper Floridan aquifer by industrial and public suppliers have resulted in saltwater intrusion in the Brunswick area that threatens the continued viability of this supply. This saltwater intrusion is from an underlying saltwater aquifer and was detected in the Upper Floridan wells as early as the 1950's.

In April 1997, the Georgia Environmental Protection Division (EPD) released the final *Draft Interim Strategy for Managing Saltwater Intrusion in the Upper Floridan Aquifer of Southeast Georgia (Interim Strategy).* Among other aspects of the *Interim Strategy* is EPD's position that no new withdrawals would be permitted from the Upper Floridan aquifer in Glynn County through the end of the year 2005. The EPD would also require the development of comprehensive local water supply plans and creation of one or more advisory committees. The role of the Long Range Water Resources Committee in Glynn County is to provide the EPD with input and to guide development of the local water supply plan.

STUDY METHODS

The population of Glynn County grew at an average annual rate of 1.19 percent between the years 1970 and 1995, with over 17,500 new residents in the County as of 1995. Since 1980 the average annual growth rate in the County has been 1.47 percent. The 1995 population of the County was estimated at 68,390 in the *Glynn County Comprehensive Plan.* The population of Glynn County is expected to increase from about 68,000 residents in 1975 to about 144,000 in 2050.

In 1980, total groundwater use for the County was estimated at 101 MGD. Groundwater use has decreased in the County even though the population has grown substantially. Total groundwater use in Glynn County dropped 34 MGD from 1980 to about 67 MGD in 1995. This is primarily the result of voluntary conservation efforts by industries and other users, and has greatly reduced the rate of saltwater intrusion beneath the Brunswick peninsula.

Approximately 84 percent of Glynn County residents were served by a public water supply source in 1995, totaling approximately 7.75 MGD. Commercial use was estimated at 3.47 MGD of the public water supply use. In addition to the permitted water use in the County, there was approximately 5.56 MGD in unpermitted water use by smaller withdrawers, primarily individual residences and smaller commercial users. Golf course withdrawals of 4.54 MGD were estimated for the 206 holes currently in the County.

As Glynn County continues to grow and develop, the percentage of residents and businesses that use public water supply will continue to increase. For the purposes of this study, it was assumed that residential population served will increase from the existing level of approximately 84 percent to 95 percent by the year 2010, and stay at 95 percent through the year 2050. Commercial water use, currently only 58 percent from public water supply, was assumed to increase to 90 percent by 2010, 95 percent by 2020, and to remain at 95 percent through 2050. All residential and commercial water use was assumed to grow at the same rate as the projected population growth (1.36 percent annually).

This produces a 2050 demand of 27.1 MGD for total residential and commercial use, versus the 1995 demand level of 13.31 MGD.

Assuming that golf course demand grows at the same rate as population, demand is projected to increase from 4.54 MGD in 1995 to 9.04 MGD by 2050. It is assumed that all new water withdrawals for golf course irrigation will be from non-Floridan aquifers. Floridan pumpage has already been reduced at golf courses on Jekyll and St. Simons Island by shifting to Miocene aquifer wells.

Industrial water use was projected to remain constant for the major water users, Georgia-Pacific and Hercules. This is based on interviews with their staff and their stated desire to maintain or reduce use from current levels (approximately 45 MGD). LCP Chemicals was shut down in 1995 reducing Floridan pumpage by approximately 9 MGD. Georgia-Pacific has reduced pumpage from about 55 MGD in the early 1980's to about 35 MGD in 1996 and Hercules has reduced pumpage from about 24 MGD in the early 1980's to 9 MGD in 1996. Other industrial use was assumed to grow at the same rate as the County population. This produces a 2050 figure of 53.72 MGD for 2050 industrial demand, versus the 1995 demand of 49.15 MGD.

Total Glynn County water use is projected to grow from the 1995 level of 67.03 MGD to 89.91 MGD in 2050. Assuming that existing sources are used, and that new golf courses are required to use non-Floridan aquifers, demand on the Floridan aquifer would grow from its 1995 level of 65.10 MGD to a 2050 level of 84.52 MGD. An additional note is that current permitted capacity for residential and commercial uses will be exceeded in approximately 2004 if demands grow at the projected rates.

Water Conservation Options. Once unconstrained water demand projections were developed, the effect of water conservation was evaluated. A variety of long-term conservation options available to communities were reviewed, including metering and leak detection, plumbing code revisions, water saving devices, water rates, landscaping changes, water use restrictions, and water reuse. For short-term or long-term demand reductions to be effective, a water conservation public education program should be developed. Both Hercules and Georgia-Pacific have already implemented substantial water conservation efforts. The maximum achievable reduction for Hercules and Georgia-Pacific is believed to be in the 5 percent range.

WATER SUPPLY OPTIONS

Once the projected water demands were established, options to meet those demands were identified. These options consisted of 1) the analysis and evaluation of various alternatives already developed in previous studies; and 2) analysis and evaluation of several options not previously studied, including use of the Miocene Aquifer, location of a wellfield in Camden County, aquifer storage and recovery, reclamation of industrial non-contact process water and the use of a surface water reservoir. Each option was evaluated in relation to current cost estimates, water quality and quantity, and regulatory restrictions and advantages.

Water Demand Scenarios. Four demand scenarios were developed for the year 2020 and 2050 planning horizons for a total of eight scenarios. Six of the demand scenarios involve reductions in pumpage in the Brunswick peninsula of approximately 10, 50 and 100 percent. It is important to note that these reductions were analyzed for the purposes of determining hydrologic feasibility and cost only. The analysis was performed to examine the extremes of the potential outcomes associated with EPD's Southeast Georgia Water Management Strategy.

In addition to the eight demand scenarios, two location scenarios were evaluated. The first location scenario presumes that the entire water demand for the eight scenarios above is supplied by a single "stand-alone" alternative; e.g., the Everett wellfield. The second location scenario presumes that a northern Camden County wellfield supplies the southern part of the County mainland, and that a western Glynn County wellfield supplies the Brunswick, north and west County mainland service areas.

GW Well Options. Groundwater options include pumping from the Upper Floridan aquifer at new sites in western Glynn County and northern Camden County (away from the saltwater intrusion area in the Brunswick peninsula), pumping from the shallower Miocene aquifer and new wells in the Lower Floridan aquifer. Fifty-four (54) options involving relocation of wells in the upper Floridan were evaluated based on computer simulations by the USGS. Important results of these computer modeling are as follows: (1) No option that increases water withdrawal at any location in western Glynn or north Camden County without reducing pumping in Brunswick can be implemented without causing water levels to decline in the Brunswick Peninsula. (2) Conversely, all options that simulated a reduction in pumping on the Brunswick Peninsula with pumping shifted to western Glynn County or to north Camden County were characterized by acceptable levels of localized drawdown and water level rises in Brunswick.

The Miocene aquifer and Lower Floridan aquifer

options would require no transmission line costs. For that reason, they are the most economic of the options considered. The quality and long term quantity of water from these alternative aquifers are uncertain at this time; however, Miocene wells have been successfully developed on Jekyll Island, Colonels Island and St. Simons Island. Glynn County and the Branigar Corporation are currently funding a Miocene aquifer study which should produce valuable data on its potential for potable water supply. Comments from the USGS suggest that the Lower Floridan would have the best potential for water supply development on Jekyll and St. Simons Islands; however, more data is needed to confirm this hypothesis.

Surface Water Options. Several studies have been performed that investigate the use of the Altamaha River as a surface water supply source for the County. These were updated to reflect current costs and water demands. While surface water from the Altamaha is technically feasible, it is much more expensive than development of ground water sources, because of the costs associated with surface water treatment and transmission. Also, any proposal to withdraw surface water from the Altamaha would face substantial environmental opposition.

Based on a review of topographic maps, Glynn County does not have suitable topography (too flat) to support the construction of a new surface water supply reservoir. Also, significant environmental impacts would result from development of a surface water reservoir.

Desalination Options. A planning level feasibility analysis was performed on the use of desalination of brackish water as a potential water supply source for the County. However, the costs of desalination were so great (treatment costs alone range from $4.33 per 1,000 gallons to $6.39 per 1,000 gallons of water treated) that the analysis was not carried beyond the preliminary stage.

Groundwater Recharge Options. A brief analysis of the feasibility of artificial recharge was performed for the Glynn County/Brunswick area. All of the scenarios considered would involve the treatment and underground injection of surface water. Because of the cost of this option, the potential for adverse effects on the saltwater plume in Brunswick and concerns with mixing water of different chemical qualities, this option was not deemed feasible.

Water Reuse Options. A proposal for reuse of Hercules' non-contact cooling water as a potential drinking water source for the County and/or the City of Brunswick was reviewed as part of this study. The technical feasibility of treating the Hercules non-contact cooling water was confirmed on a preliminary level. However, the unit cost of this water ($1.30 per 1,000 gallons) is much higher than development of previously mentioned groundwater options. Its primary value would be to provide a quick source of water supply without capital expenditure by local governments.

STUDY RESULTS

The nine remaining major water supply alternatives and sub-alternatives were each ranked according to their respective total annual costs. The options were ranked by lowest unit cost in dollars per thousand gallons of water delivered.

A qualitative non-economic ranking of the remaining options was also prepared. A ranking of High, Medium, Low or No Change was assigned to each of several non-economic criteria. These criteria included: saltwater intrusion (the effect of the alternative on the saltwater plume in the Brunswick Peninsula); (a qualitative ranking of the ease or difficulty of obtaining permits from Georgia EPD or other regulatory agencies); intergovernmental (an assessment of the level of cooperation required among local governments); longevity (an assessment of whether or not the potential source would be considered a long-term or short-term water supply option); and environmental (an assessment of the potential environmental effects of developing an alternative, other than the saltwater intrusion aspects).

The options that ranked highest in non-economic terms were Miocene aquifer development, Bladen Wellfield, and Everett Wellfield. The Camden County Wellfield and Altamaha Water Project (groundwater option) were ranked next most favorable. Surface water options were ranked fairly low, primarily due to environmental concerns. The Lower Floridan aquifer and TSG/Hercules Water Reuse options were ranked lowest in non-economic terms, primarily because of concerns with regard to water quality, longevity and regulatory issues.

When the ranking process was completed, the results were presented to the Glynn County Long Term Water Resource Management Advisory Committee. The Committee considered the various alternatives for future water supply, and members voted on their preferences. Each alternative was ranked by the 13 voting Committee members. The Committee's direction on future water supply sources was integrated with other aspects of the study and resulted in the following recommendations.

RECOMMENDATIONS

These recommendations are made on the best information available at this time, and are subject to change as circumstances change. Nevertheless, they are offered as a rational set of options to meet Glynn County's short- and long-term water needs with minimal cost and few environmental impacts, and to manage the salt water intrusion problems in Brunswick.

1. Continue development of the Miocene Aquifer for short-term needs through 2004.
- Complete studies of Miocene Aquifer potential.
- Emphasize the need for State funding for additional studies of Miocene Aquifer
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2. Plan for shifting Upper Floridan pumpage to wellfield in western Glynn County (Bladen) or north Camden County to meet long-term water needs.
- Obtain EPD concurrence with USGS modeling and strategy for shifting pumpage.
- Prepare detailed engineering studies, develop financial and governmental mechanisms to implement project
- Prepare County-wide Capital Improvements Plan to ensure orderly development of needed water and wastewater facilities.

3. Develop and implement comprehensive water conservation plans for permitted public water suppliers in Glynn County
- Explore opportunities and costs associated with additional industrial water conservation.

4. Maintain and upgrade wastewater treatment capacity at existing plants.
- Maintain capacity of Academy Creek WPCP and Jekyll Island WPCP; upgrade to meet any new regulatory requirements.
- Upgrade St. Simons Island WPCP capacity to meet demands by 2005.
- Upgrade I-95 / US 17 WPCP capacity to meet demands by 2005.

5. Additional Study Needs
- Emphasize the need for State funding for additional studies of the Lower Floridan Aquifer. If results favorable, begin development of Lower Floridan Aquifer sources.
- Periodically, perform updates to keep the Long Term Water Resource Management Plan current

6. Coordination Mechanism: Establish permanent local review group (primarily local water suppliers, with other interested citizens) that would review water withdrawal permit requests and make recommendations to EPD on those requests.

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